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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WENG HONG TEH, ZUOMING MING ZHAO, and DANNY R. SINGH

Appeal 2015-004903
Application 13/539,444
Technology Center 2800

Before CHUNG K. PAK, BRIAN D. RANGE, and MICHAEL G. McMANUS, *Administrative Patent Judges*.

McMANUS, *Administrative Patent Judge.*

DECISION ON APPEAL

The Examiner finally rejected claims 1–3, 5, 7–10, 12–14, and 16–19 of Application 13/539,444 under 35 U.S.C. § 103(a) as obvious. Final Act. 2–7 (mailed Dec. 18, 2013). Appellants[1] seek reversal of these rejections pursuant to 35 U.S.C. § 134(a). We have jurisdiction under 35 U.S.C. § 6.

For the reasons set forth below, we affirm.

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[1] Intel Corporation is identified as the real party in interest. Appeal Br. 3.

BACKGROUND

Application 13/539,444 describes certain packaging for microelectromechanical systems (MEMS) devices and a method for making same.

Claims 1 and 9 are representative of the pending claims and are reproduced below:

1. An apparatus comprising:

a carrier comprising multiple build-up layers including dielectric layers and conductive layers;

a die embedded in the carrier, the die comprising a first side and an opposite second side comprising a device side with contact points and lateral sidewalls defining a thickness of the die, the carrier coupled to the second side of the die; and

at least one microelectromechanical system (MEMS) device within the carrier, the at least one MEMS device comprising a static portion and a free portion and an anti-stiction material disposed between the static portion and the free portion.

9. A method comprising:

forming a first portion of a build-up carrier adjacent a device side of a die, the first portion comprising at least one layer of patterned conductive material coupled to a contact point of the die;

forming a second portion of the build-up carrier on the first portion, the second portion comprising at least one microelectromechanical system (MEMS) device within the second portion in an area pre-determined to be void of a patterned layer of conductive material, the at least one MEMS device comprising a static portion and a free portion; and

disposing an anti-stiction material between the static portion and the free portion of the MEMS device.

Appeal Br. 12–13 (Claims App.).

REJECTIONS

On appeal, the Examiner maintains the following rejections:

1. Claims 1, 3, 5, 7–10, 13–14, and 17–19 are rejected under 35 U.S.C. § 103(a) as obvious over Drews et al. (US 2010/0207216 A1, pub. Aug. 19, 2010) ("Drews") in view of Fillion et al. (US 2011/0299821 A1, pub. Dec. 8, 2011) ("Fillion"), and further in view of Lutz et al. (US 6,930,367 B2, iss. Aug. 16, 2005) ("Lutz") and Hammond et al. (US 8,314,467 B1, iss. Nov. 20, 2012) ("Hammond"). Final Act. 3.

2. Claims 2, 12, and 16 are rejected under 35 U.S.C. § 103(a) as obvious over Drews, in view of Fillion, Lutz, and Hammond, and further in view of Chen et al. (US 7,580,174 B2, iss. Aug. 25, 2009) ("Chen"). Final Act. 7.

DISCUSSION

Rejection 1. The Examiner rejected claims 1, 3, 5, 7–10, 13–14 and 17–19 as obvious over Drews, in view of Fillion, Lutz and Hammond. Appellants allege several bases of error in the rejection. First, Appellants argue that the Drews reference does not teach a "carrier." Appeal Br. 8. Second, Appellants assert that the Examiner has not stated a proper basis to combine the teachings of Drews and Fillion. *Id.* at 9. Third, Appellants contend that the Examiner has not stated a motivation to use an anti-stiction material with the microviscosimeter of Drews. *Id.*

Drews' Teaching of a "Carrier"

Appellants argue that the Drews reference does not teach a "carrier." Appeal Br. 8. Rather, Appellants assert, Drews "appears analogous to a die, not a carrier of a die." *Id.* In the Answer, the Examiner notes that, "in the Final Rejection, Drews et al. were relied upon for teaching a 'carrier' having the claimed build-up layers and the MEMS within (see FR 3). Drews et al. teach [a] device that has a series of build-up layers that 'carry,' *inter alia,* the circuit component 102." Answer 3 (footnote omitted).

The Appellants do not propose a definition of the term "carrier," nor does the Specification provide an explicit definition. The Specification does, however, provide that "[c]arrier 120 includes multiple build-up layers including dielectric layers 130 and conductive layers 140 (connected with conductive vias or the like) that provide connectivity to the die (power, ground, input/output, etc.)." Spec. ¶ 28. The Specification further provides that "the carrier is made of multiple layers or levels of patterned conductive material such as copper that are separated from adjacent layers by dielectric or insulating material. It is appreciated that the patterning of conductive layers separated by dielectric material offers space (area and volume) for additional devices." Spec. ¶ 31.

The Examiner asserts that the MEMS structure of Drews is a "carrier." The Examiner finds that such structure includes "multiple build-up layers including dielectric layers [ ](106.5-8) and conductive layers (106.1-4)." Final Act. 3; *see also* Drews ¶ 57. "[D]uring examination proceedings, claims are given their broadest reasonable interpretation consistent with the specification." *In re Hyatt*, 211 F.3d 1367, 1372 (Fed. Cir. 2000). Giving the term "carrier" its broadest reasonable interpretation,

it is apparent that it encompasses the multilayer structure encompassing a MEMS device (108) depicted in Figure 1 of Drews.

Combination of Drews and Fillion

For their second argument, Appellants assert that the Examiner has not stated a proper basis to combine the teachings of Drews and Fillion. Appeal Br. 9. The Examiner determined that

> it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the carrier layer of Drews to include the embedded [l]ogic device/die of Fillion for the purpose of providing means for one or more logical operations on one or more input signals.

Final Act. 4. In contesting such finding, Appellants assert that "[i]t is not clear where a die would be positioned on such a substrate." Appeal Br. 9.

A preponderance of the evidence supports the Examiner's finding that there is "sufficient guidance to a person having ordinary skill in the art at the time of the invention to place the die within the carrier with a reasonable expectation of success." Answer 3–4. Further, it is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements. *In re Etter,* 756 F.2d 852, 859 (Fed. Cir. 1985) (en banc) ("Etter's assertions that Azure cannot be incorporated in Ambrosio are basically irrelevant, the criterion being not whether the references could be physically combined but whether the claimed inventions are rendered obvious by the teachings of the prior art as a whole"); *In re Sneed,* 710 F.2d 1544, 1550 (Fed. Cir. 1983) ("[I]t is not necessary that the inventions of the references be physically combinable to render obvious the invention under review"). Accordingly, Appellants' argument regarding the positioning of the die is not persuasive.

Appellants further assert that there is no reason to combine the die of Fillion because "active region 118 associated with the substrate of Drews can presumably achieve the objective of providing logical operations or input signals." Appeal Br. 9. In response, the Examiner provides as follows:

> It seems that if Drews et al. active region were purposed for logic operations, as Appellants appear to assert, a person having ordinary skill in the art at the time of the invention would have also appreciated the benefit of a completed logic die having functionality to operate in tandem with the Drews et al. MEMS device. The combination provides a package that would allow the end user the capability of taking the MEMs sensor data, and through the logic die of Fillion provide means to manipulate and control the sensor data.

Answer 5. That is, the known die of Fillion could be substituted for the active region of Drews. "[W]hen a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007), citing *U.S. v. Adams*, 383 U.S. 39, 50–51 (1966). Here, there is no allegation that anything more than a predictable result is achieved. Accordingly, we find that the Appellants have not shown error in the Examiner's combination of the teachings of Drews and Fillion.

Motivation to Use an Anti-Stiction Material

Appellants further contend that the Examiner has not stated a motivation to use an anti-stiction material with the microviscosimeter of Drews. Appeal Br. 9.

The Examiner found as follows:

> it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the microelectro-mechanical switching device of Hammond to provide anti-stiction material to all active members of the mechanical structures; in order to "minimize, overcome and/or avoid the debilitating effects of stiction . . . ."

Final Action 4–5; *see also* Answer at 7 ("the ground of rejection involves a substitution of the Hammond et al. MEMS device in place of Drews et al. MEMS device").

That is, the Examiner found that one of ordinary skill in the art would be motivated to use an anti-stiction material with the device of **Hammond**, while the Appellants argue that there is no motivation to use an anti-stiction material with the device of **Drews**. In their Reply Brief, Appellants assert that their argument regarding Drews is equally applicable to Hammond: "the MEMs device of Hammond would function similarly to the device of Drews." Reply Br. 2–3 (emphases omitted). We do not find this persuasive. Rather, we adopt the Examiner's finding that the switch of Hammond (rather than the microviscosimeter of Drews) "must be able to not just make contact, but also release, or deflect. . . . As such, an anti-stiction material would have been recognized by a person having ordinary skill in the art as beneficial in the Hammond et al. MEMS device as well." Answer 8.

Accordingly, Appellants have not identified harmful error in the Examiner's finding regarding the motivation of one of ordinary skill in the art to use an anti-stiction material with the MEMS device of Hammond.

Claims 9 and 13

The Appellants assert that the Examiner erred in rejecting claims 9 and 13. With regard to claim 9, they assert that "[t]here is no indication of a possible location for a die with the microviscosimeter [of Drews]" (Appeal Br. 10), and that "[t]he asserted combination does not describe forming a carrier adjacent a die and a MEMS device within a carrier" (*id.*).

This essentially reiterates Appellants' prior argument regarding the combination of Drews and Fillion. As above, a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements. *Etter*, 756 F.2d at 859. Further, the Examiner specifically finds that Drews teaches a carrier including a MEMS device and "Fillion discloses a first portion [of a build-up carrier] is adjacent a device side of a die (40), in the lower portion of a carrier (37)." Final Act. 5–6. Accordingly, Appellants have failed to show error in the rejection of claim 9.

With regard to claim 13, Appellants repeat certain arguments made in regard to claim 1, and further assert that "Drews does not specifically describe a package so the combination of references do not describe a die and MEMS device in a package or carrier." Appeal Br. 10 (emphasis omitted). In doing so, Appellants do not offer a definition of "package" nor respond to the Examiner's finding, in the Answer, that "[t]he combination provides a package that would allow the end user the capability of taking the MEMs sensor data, and through the logic die of Fillion provide means to manipulate and control the sensor data." Answer 5. We further note the

statement in the Specification that "[m]icroelectronic devices, including MEMS devices, are typically contained in a package that allows a connection to another device" (Spec. ¶ 5), suggesting that it is well known to include a MEMS device within a package.

Accordingly, Appellants have not identified harmful error in the Examiner's finding or determination in this regard.

Rejection 2. The Examiner rejected claims 2, 12, and 16 as obvious over Drews, in view of Fillion, Lutz, and Hammond, and further in view of Chen. Appellants assert that these claims are not obvious at least for the reasons stated in regard to the claims from which they depend, discussed *supra*. Appeal Br. 11. Appellants further assert that one of skill in the art would not be motivated to incorporate the teaching of Chen to use a dielectric as an anti-stiction material. *Id.*; *see also* Final Act. 7. Specifically, Appellants assert that one of ordinary skill in the art would not be motivated to use an anti-stiction material with the microviscosimeter of Drews. As discussed above, the Rejection does not posit a combination that includes the microviscosimeter of Drews. Rather, the combination includes the MEMS device of Hammond. Answer 7–8.

Accordingly, as with Appellants' argument regarding the teaching of the use of anti-stiction material of Lutz (Appeal Br. 9), the present argument fails to identify harmful error by the Examiner.

CONCLUSION

The rejections of claims 1–3, 5, 7–10, 12–14, and 16–19 of Application 13/539,444 under 35 U.S.C. § 103(a) as obvious are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED